SECTION II
REMARKS

Regarding the Amendments

Claims 1, 7, 15, 22 and 30 have been amended as set forth in the above Complete Listing of the Claims. As amended, the claims are supported by the specification and the original claims. No new matter has been added, as defined by 35 U.S.C. § 132.

Specifically, the claims have been amended to clarify that the CNT structure recited therein is composed of CNT layers attached directly to the substrate and attached directly to one another, without use of chemical anchors. Support for such is found in the specification, in the preferred embodiment description of the invention, as set forth in the Examples.

Thus, upon entry of the amendments, claims 1-5 and 7-31 will be pending, of which claims 1-5, 12, 14-21, 27 and 29 are withdrawn.

Rejection of Claims 7-11, 22-26, 30 and 31 Under 35 U.S.C. §103

The examiner has maintained the rejection of claims 7-11, 22-26, 30 and 31 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent 6,872,681 (hereinafter "Niu et al.") in view of Mamedov et al., Nature Materials 1:190-194, 2002 (hereinafter "Mamedov et al."). By the present Office Action, the examiner has also rejected claims 13 and 28 under 35 U.S.C. §103(a) as being unpatentable over Niu et al. in view of Mamedov et al. Applicants respectfully disagree.

As pending, independent claims 7 and 22 each recite in step (a):

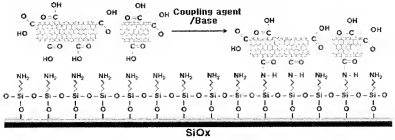
> "reacting a substrate having amine groups exposed on the surface or a substrate having amine groups exposed in a pattern with CNT having exposed carboxyl groups to form a CNT single layer or single layer pattern on the surface of the substrate by amidation reaction between the amine groups and the carboxyl groups (emphasis added)..."

As such, the claims recite a step where the CNT is bound directly to the substrate to form a CNT single layer on the surface of the substrate. Such direct binding is also described in the specification of the present application at page 13, lines 1-4:

> "[t]he CNT having exposed carboxyl groups, prepared in Example 1, was reacted with the substrate having exposed amine groups, prepared in Example 2 to form a CNT single layer on the

substrate by amide bond formation between the carboxyl group and the amine group (FIG. 1(a))."

Figure 1(a) illustrates direct binding of the CNT to the substrate:



Furthermore, the Abstract of the application describes:

> "[a] CNT film or pattern which is produced by laminating repeatedly carbon nanotubes (CNT) by chemical bond on the substrate..." (Emphasis added.)

It is clear that the CNT films or patterns of the invention comprise CNTs chemically bound directly to the substrate on which they are formed. Niu et al. in view of Mamedov et al. does not teach such a CNT film or pattern.

The examiner's attention is respectfully drawn to the Mamedov et al. references, where generation of the films of that article included the step where "a single PEI/PAA bilayer was deposited on a bare glass or silicon substrate before the SWNT assembly." PEI and PAA layers are necessary to the film of Mamedov et al., as stated on page 191, second full paragraph, in order to "improve the linearity of the deposition process and present a convenient chemical anchor for subsequent modification." One of skill in the art, relying on Mamedov et al., would not expect that a CNT film or pattern lacking a PEI/PAA layer between the substrate and the first layer of CNT would be sufficient for linear deposition or would be effective when lacking such a "chemical anchor."

In considering a reference for its effect on patentability, the reference is required to be considered in its entirety, including portions of teach away from the invention under consideration. Simply stated, the prior art must be considered as a whole. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984); MPEP § 2141.02. "It is impermissible within the framework of section 103 to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly

suggests to one of ordinary skill in the art." *Application of Wesslau*, 353 F.2d 238, 241 (C.C.P.A. 1965); *Bausch & Lomb, Inc. v. Barnes-Hind/Hydrocurve*, 796 F.2d 443, 448 (Fed. Cir. 1986), cert. denied, 484 U.S. 823 (1987).

In *KSR International Co. v. Teleflex Inc.*, No. 04-1350, 550 U.S. ___ (April 30, 2007), the Supreme Court further confirmed that references that teach away from the invention are evidence of the non-obviousness of a claimed invention, (*KSR*, slip op. at pp. 20-23) and reaffirmed the principle that a fact finder judging patentability "should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning."

The cited Niu et al. reference describes carboxylated CNTs. However, Niu et al. does not describe formation of CNT layered structures on a substrate. Niu et al. viewed in light of Mamedov et al. does not remedy the above deficiencies.

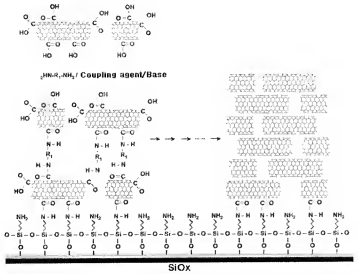
Mamedov et al. provides a SWNT assembly containing a PEI/PAA layer between the substrate and the first layer of CNT. Such an assembly teaches away from the presently claimed CNT film or pattern where the CNT is bound directly to the substrate. Even where Niu et al. Niu et al. in view of Mamedov et al. therefore does not provide all elements of the claimed invention and therefore the claims of the invention are not obvious in view of the cited references.

Additionally, the examiner alleges that the recitation of the transitional phrase "consisting essentially of" in independent claims 7 and 22 is not effective to limit the claims to the "basic and novel characteristics" of the invention as such characteristics are not clearly indicated in the specification or claims. Applicants respectfully disagree and allege that by the disclosure of the specification and claims it is clear that CNT films, patterns or biochips of the invention contain the basic and novel characteristics of CNTs bound directly to the substrate without intervening chemical anchors and CNT layers bound directly to other CNT layers without intervening chemical anchors.

In the examples section of the application, a preferred embodiment is provided in Examples 1-3, wherein the CNT film is assembled by reaction of a carboxylated CNT (Example 1) with a substrate with exposed amine groups (Example 2) that react by amide bond formation between the two "to form a CNT single layer on the substrate." (Specification, page 13.) Next "another CNT layer by the formation of amide bond" was performed. Such sequential CNT layer

formation may be performed "n times." By sequential CNT layering and amidation, it is apparent that a basic and novel characteristic of the resulting CNT film, pattern or biochip is that it consists essentially of CNT layers and not any type of chemical anchor.

The examiner's attention is respectfully drawn to Figure 1(c), which illustrates a CNT film of the invention.



It is apparent that the exemplary film of this figure involves a substrate with six CNT layers directly layered on the substrate. No chemical anchors are present in that film.

In order to clarify this characteristic of the CNT structures of the invention, language has been added to the claims, as set forth above, to clarify that the structures of the invention are generated without use of chemical anchors, contrary to the teaching of the Mamedov et al. reference that a chemical anchor (viz., a PEI/PAA layer) is necessary.

Niu et al. in light of Mamedov et al. fail to provide any derivative basis for the claimed invention, as Niu et al. in light of Mamedov et al. does not describe a CNT film, pattern or biochip consisting essentially of CNT layers, as clearly indicated in the specification and claims of the present application. Furthermore, Niu et al. in light of Mamedov et al. would require a film with PEI/PAA layers between the substrate and the first CNT layer and, preferably, every five or so CNT layers after that, to serve as a chemical anchor ("after every fifth deposition cycle, a layer of SWNT was replaced with a layer of poly(acrylic acid)" Mamedov et al., p. 191). Accordingly,

no basis of *prima facie* obviousness of the claimed invention is presented by such cited references.

With regard to pending and independent claims 7, 22 and 30, Niu et al. in light of Mamedov et al. do not describe a CNT film, pattern, biochip or multilayer structure consisting essentially of layers of CNT. The present invention, by modification of the exposed carboxyl groups directly on a CNT to amines and binding to a subsequent carboxylated CNT, eliminates the need for such linearity improvement and "chemical anchors" and thus provides an improvement over a layered composition as provided by Niu et al. in light of Mamedov et al.

Since Niu et al. in light of Mamedov et al. does not provide any logical basis for the CNTs recited in claims 7-11, 13, 22-26, 28, 30 and 31, Niu et al. in light of Mamedov et al. does not render the claimed invention obvious. Accordingly, withdrawal of the rejection of claims 7-11, 13, 22-26, 28, 30 and 31 under 35 U.S.C. § 103 (a) as being obvious over Niu et al. in light of Mamedov et al. is respectfully requested.

CONCLUSION

Based on the foregoing, all of Applicants' pending claims 7-11, 13, 22-26, 28, 30 and 31 are patentably distinguished over the art, and are in form and condition for allowance. The Examiner is requested to favorably consider the foregoing and to responsively issue a Notice of Allowance.

No fees are believed to be due for the filing of this paper. However, should any fees be required or an overpayment of fees made, please debit or credit our Deposit Account No. 08-3284, as necessary.

If any issues require further resolution, the Examiner is requested to contact the undersigned attorney at (919) 419-9350 to discuss same.

Respectfully submitted,

Date: April 11, 2008

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In re United States Patent Application of:		Docket No.:	4240-104
Applicants:	JUNG, Hee Tae, et al.	Conf. No.:	9621
Application No.:	10/805,044	Art Unit:	1639
Date Filed:	March 19, 2004	Examiner:	Christopher M. Gross
Title:	METHOD FOR FABRICATING A BIOCHIP USING THE HIGH DENSITY CARBON NANOTUBE FILM OR PATTERN	Customer No.:	23448

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Abbreviations

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HR Host receive	PR Polled remote	CP Completed	TS Terminated by system	G3 Group 3
WS Waiting send	MS Mailbox save	FA Fail	RP Report	EC Error Correct